elected into the Royal Society in 1861, and served on the Council in 1870–72, and again in 1881–83. He was a well-read, scholarly man, of sound judgment, and a shrewd judge of character. He was never married, but was very fond of children, with whom he was very popular, in spite of certain peculiarities of manner and speech and little affectations of dress—such as a passion for coloured ties—amiable weaknesses which only served to endear him still more strongly to his many friends. He was an excellent teacher, with a quiet dignity of manner, and a subtle appreciation of humour, with a skill in parrying its shafts, which effectively checked the efforts of the potential Ben Allens and Bob Sawyers at Guy's, or the too exuberant spirits of the young lieutenants of H.M.S. *President* at Greenwich. He served for three periods—in all fifteen years—as an examiner in chemistry of the University of London in the old Burlington Gardens days. His sympathy with young men, and his quick discernment of character and merit, together with his experience as a teacher and his wide knowledge of his subject, were excellent qualifications for the position, and he enjoyed the fullest confidence of his colleagues at the famous round-table in the old university buildings. T. E. T.

NOTES.

We notice the names of three fellows of the Royal Society, all of whom are engaged in Government departments, in the list of New Year honours, namely, Dr. Lazarus Fletcher, director of the Natural History Departments of the British Museum, who has been knighted; Col. H. C. L. Holden, assistant director of supplies and transport, War Office, who has been promoted to the rank of K.C.B.; and Sir W. Watson Cheyne, who has received the honour of K.C.M.G. We do not recognise in the list any names of men specifically selected for honours on account of their productive work in scientific fields, but the following may be appropriately recorded here because of their association with such work:—*Knights*: Dr. Adam Smith, principal and vice-chancellor of Aberdeen University; Dr. G. A. Berry, honorary surgeon-oculist to the King in Scotland, and formerly president of the Royal College of Surgeons, Edinburgh; Dr. T. W. Parkinson, author of works on cancer and tumour; Mr. M. Rees, laryngologist to the King's Household and to Queen Alexandra. *K.C.M.G.*: Sir James Porter, honorary physician to the King. *K.C.V.O.*: Sir A. A. Bowlby, surgeon in ordinary to the King. *C.M.G.*: Dr. J. Cadman, professor of mining in the University of Birmingham. *C.B.*: Col. C. P. Martel, superintendent, Royal Gun and Carriage Factory, Woolwich Arsenal; Mr. A. W. J. MacFadden, Chief Inspector of Foods, Local Government Board.

In reply to questions asked by Mr. Lynch in the House of Commons on January 4, Mr. Asquith said that every endeavour continues to be made to organise and utilise all the available scientific ability of the country in the most efficient way with the view of coping with problems introduced by the war. The activities of the scientific committees have been by no means limited to criticism and advice with regard to suggestions and inventions sent in from outside. Mr. Asquith also said that a body of scientific workers is definitely charged with the study of actual war conditions, that is, to examine, devise, or invent appliances which may be helpful to the Allies in the field.

The Government of British Columbia has presented to the Royal Botanic Gardens, Kew, a magnificent spar of Douglas fir to replace the old flagstaff which was taken down in 1913 owing to decay. The suggestion to present a really fine specimen of a Douglas spar was made by Mr. J. H. Turner, the late Agent-General for British Columbia, and was readily taken up by the Premier and the Government of British Columbia. This suggestion, made in the autumn of 1913, has now definitely materialised, and the spar, which was loaded on to the R.M.S. *Merionethshire* in August, 1915, arrived in the Thames at the close of last year, and was moored in the river off Kew Gardens on January 3. The spar was logged from the lower mainland coast of British Columbia. The tree selected measured 220 ft. in length, 6 ft. in diameter at the large end, and 18 in. in diameter at the small end. The log was loaded on a logging railway and hauled ten miles to salt water, being taken by a tug to Vancouver. There it was hewn to its final shape, making it 215 ft. in length, 33 in. at the butt, and 12 in. at the top. Its weight is about 18 tons. The spar was brought from British Columbia on the deck of the *Merionethshire,* and its loading was accomplished with some difficulty. Its erection in the Royal Botanic Gardens will be an operation of considerable magnitude.

We much regret to note the death of Dr. George Oliver, of Riversleigh, Farnham. He was a man of very great ability and extraordinary energy. Although for thirty-five years he was engaged in a very large and exacting practice at Harrogate, he yet found time to make most valuable researches on the circulation of the blood. He was one of the first to take up the question of the pressure of blood in the arteries, and the instrument he invented for the purpose of measuring the arterial tension in man was only surpassed in ingenuity by his arteriometer for measuring the actual diameter of the artery. He also invented an ingenious instrument for measuring the amount of hæmoglobin in the blood. With these instruments he made many important observations, which he embodied in two works, "Blood and Blood Pressure" and "Studies in Blood Pressure," works which were both of scientific interest and practical value in treatment. Along with Sir Edward Schäfer he examined the action of the extract of suprarenal glands and proved it to be simply enormous. This observation is one of fundamental importance in regard to the physiological problem of how the blood pressure in the living body is maintained in equilibrium. Dr. Oliver was a gold medallist of the University of London, and Croonian lecturer in 1896 at the Royal College of Physicians, of which he was a fellow. He established the Oliver-Sharpey lectureship at the Royal College of Physicians in memory of his old teacher, Prof. William Sharpey, and he gave a course of these lectures himself in 1904. To those who knew the amount and value of Dr. Oliver's work, it was a constant source of wonder why he was not elected to a fellowship of the Royal Society. His death is a great loss to medicine, for although he was seventy-four years of age he was still active and energetic.

WE announce with regret the death, at Kilmarnock, on December 26, 1915, of Mr. A. D. Darbishire, lecturer on genetics in the University of Edinburgh, and known by his experiments bearing on the laws of heredity, and his book on "Breeding and the Mendelian Discovery." While at Oxford Mr. Darbishire came under the influence of the late Prof. Weldon, and he took up and carried on Prof. Weldon's researches on the inheritance of colour in mice—researches which were designed to test the continuous character of variations in colour, and to prove the untenability of the idea of the clear-cut, sharply distinguishable mutations postulated by Mendel and his followers. A floor case in the Natural History Museum, containing a score of mice of various colours, shows in a most instructive way the practical meaning of the results obtained by him in breeding. After his graduation, Mr. Darbishire became demonstrator of zoology in the University of Manchester, and pursued his investigations there, and gradually he became convinced of the general soundness of the Mendelian position. In 1905 he was appointed demonstrator of zoology in the Royal College of Science (afterwards incorporated in the Imperial College of Science), which post he held until 1911, when he was appointed lecturer on genetics in the zoological department of the University of Edinburgh. Mr. Darbishire endeared himself to all who came into contact with him; his personal charm was really irresistible. During the summer of 1914 he gave a course of lectures on heredity at the Graduate School held biennially in different centres under the auspices of the U.S. Department of Agriculture. Upon reaching home after the outbreak of the war he offered his services as a munitions worker, and spent some months in arduous training for this work. Later, though conscious of the fact that he was really unfit for service in the ranks, he enlisted as a private in the Argyll and Sutherland Highlanders. His appointment to a commission in the Royal Garrison Artillery was published three days after his untimely death, which has deprived British science of a brilliant follower devoted to sound research.

THE death is announced, at Cambridge, Mass., of Mr. C. A. R. Lundin, who won distinction with the firm of Messrs. Alvan Clark and Sons in the construction of many of the largest telescope lenses in the world. He was born in Sweden in 1851, and went to America in 1874, when he became associated with Messrs. Clark. Among the telescope objectives upon which he was engaged are the 30-in. objective for Pulkowa Observatory, the 36-in. lens of the Lick Observatory, the 40-in. lens of the Yerkes Observatory, the 16-in. lens of the University of Cincinnati, and the 18-in. lens of Amherst College. He had also devised and put into operation several important optical tests.

WITH the death last week of Mr. H. A. Taylor, at the age of seventy-four, there has passed away a distinguished pioneer in the development of electrical science, who was chiefly identified with most of the submarine cable enterprises undertaken within the last forty-five years. A mathematician and physicist of a high order, he was associated with the late Latimer Clark in a number of electrical researches in connection with the electromotive force of the standard cell, the effect of temperature on the electrical resistance of gutta-percha, etc. The Clark cell, if carefully used, will remain constant for years, but it polarises quickly, and is generally only used for those tests in which the batteries are tested when they are not sending any current at all, but simply maintaining a potential difference. Taylor was associated with Dr. Muirhead in the development of a system of duplexing submarine cables, which is a modification of the bridge method, and has proved remarkably successful, many important cables, such as those of the Eastern Telegraph Co. and the various Atlantic cables being worked on this plan. The introduction of automatic transmission for cable circuits was also in a large measure due to him.

FROM Würzburg comes the news of the death there on December 2, 1915, of Dr. Fritz Regel, the professor of geography and director of the Geographical Seminar at the University. Regel was born on January 17, 1853; and his first teaching work was done at the Stoy Institute, in Jena. In 1892 he was given the first full chair in geography at the Jena University, where he taught until 1908, when he moved to Würzburg. His skill as a teacher of geography was renowned; no less so was his fame as a writer. He was one of the best authorities on his own native district, Thuringia, about which he wrote the "Landeskunde" (fourth edition in 1913), and a "Handbuch" in three volumes. But he also had more than a passing knowledge of other portions of the globe, as his various books testify—"Kolumbien" (1899), "Die Nord- und die Südpolforschung" (1905), "Der Panamakanal" (1908), his admirable survey of South America (1910), and his description of western, northern, and eastern Europe (1909), the second and first volume respectively of the "Geographisches Handbuch"; and last, but by no means least, his "Landeskunde der Iberischen Halbinsel" (1905), based on travels in Spain.

DR. C. F. HOLDER, who died in October last, was a good type of the open-air naturalist, who combined in a somewhat unusual way a love of sport with a devotion to the cause of wild-life protection. He was born in 1851 in Massachusetts, of Quaker stock, and was devoted to natural history from boyhood. His early work was as a curator in the American Museum of Natural History in New York City, but considerations of health led him in 1885 to Pasadena, in southern California, where he spent the rest of his life, observing and fishing and writing. He was a good citizen of a notably beautiful city, and took a great interest in local educational affairs. Shortly before his death he was appointed honorary professor of zoology in the Throop College, the foundation of the chair being due to a lifelong friend, Dr. George E.

Hale, director of Mount Wilson Observatory. Among Dr. Holder's numerous popular books may be mentioned:—"Living Lights" (1887), a picturesque and concrete account of phosphorescent animals and plants, his interesting lives of Louis Agassiz and of Charles Darwin, besides "Along the Florida Reef" (1892), "Stories of Animal Life" (1900), "Half-Hours with Nature" (1901), "The Log of a Sea Angler," and "Life in the Open in Southern California." He was tireless in his endeavours to infuse into others his own enthusiasm for natural history, to broaden the interests of the sportsman, and to strengthen the hands of Audubon societies and similar leagues which have for their object the conservation of the wild life of both land and sea.

The *Times* of December 30 publishes the following note from its Huddersfield correspondent:—Good progress is being made in carrying the British Dyes (Limited) scheme into effect. With more than 3000 workmen, the contractors, Messrs. McAlpine, are pushing forward the erection of the works, which will form the main portion of the scheme. The chief hindrances are the scarcity of labour and of raw materials for the manufacture of colours. Exceptionally high rates of wages are being offered for men, from ordinary navvies to skilled artisans and chemical workers. Many hundreds of men drawn from other occupations have become chemical workers and are making more money than ever they earned before. As for raw materials, British Dyes (Limited) are obtaining a preference in regard to supplies, and the output is steadily increasing. While the demand cannot yet be fully met, it is officially stated that within another month the supply will be much more adequate.

The report of the council of the Scottish Meteorological Society, read at the general meeting of the society on December 21, shows that during the past year the more purely routine work of the society has proceeded much on the usual lines, though difficulties inseparable from war conditions have arisen, and at one or two stations it has been found impossible to continue a full set of observations. At most of the stations in Scotland the work is in the hands of voluntary observers, and the closer connection that now exists between Edinburgh and the Meteorological Office in London has in no way weakened the almost family loyalty that linked the observers to the society. Indeed, the extended publicity now available for trustworthy observations through the medium of the Monthly Weather Report has been greatly appreciated by the observers. During recent years the society has devoted much attention to the encouragement of the observation of rainfall in Scotland, and there are now available in the Journal monthly and annual figures for more than 700 stations. An improvement has taken place in the representation of the upper part of the Spey valley; but there are still large areas in the Highlands and north of Scotland for which no information is available. Prof. R. A. Sampson, Astronomer Royal for Scotland, has been elected president of the society for the ensuing twelve months, and Mr. C. T. R. Wilson, University lecturer in physics, Cambridge, and Dr. A. Crichton Mitchell, Edinburgh, vice-presidents.

We have received the annual report of Livingstone College for the year 1914–15. We have on several occasions directed attention to the work of this college, which is to give an elementary training in medicine to missionaries. The college as such is closed for the present, as it is being used as a hospital for convalescent wounded soldiers.

A first report of the Special Investigation Committee of the Medical Research Committee upon the incidence of phthisis in relation to occupations has recently been issued, and deals with the boot and shoe industry. The conclusions arrived at are: (1) that phthisis is specially prevalent among workers in the boot and shoe industry, as compared with the general population; (2) the individual worker is predisposed to infection by the sedentary nature of his employment, and possibly by the attitude he adopts at his work; (3) the infection is probably (*a*) increased by the number of infective workers, and (*b*) favoured by want of light, the presence of infected dust, and inadequate ventilation in the workrooms. The measures suggested to diminish the incidence of phthisis among this class of operatives are improvement of lighting, floor cleaning, and ventilation in the factories, and the introduction of periods of rest and exercise for the workers. A modified scheme of sanatorium treatment for the affected is also outlined.

We commend to our readers the admirable article by Prof. Fraser Harris in the *Scientific Monthly*, October, 1915, on "Edward Jenner and Vaccination." Prof. Fraser Harris gives us a short historical sketch of the earlier ages of smallpox in Europe; the old story, how disease, like trade, "follows the flag"—follows, *pede aequo*, the crescent and the cross. Then an account of the discovery of inoculation: a method of great antiquity, used far and wide among "savages," let alone the Turks, who taught it to Lady Mary Wortley Montagu. Then a careful description of the rise and development of Jenner's work, and a sufficient notice of the objections raised against it. Especially, he answers well the stock objection, that not Jenner but "sanitation" saved us from the scourge of smallpox. Perhaps, in years to come, men of science will discover some method of personal immunity even better than vaccination; some "vaccine" made without the intermediary calf. If or when they do make that discovery, they will make it on the direct lines of the work which Jenner began and Pasteur advanced. In that day, let us hope, the nation will put Jenner's statue back in Trafalgar Square. If there is no room for it, they can move King George IV. to the vacant pedestal in Kensington Gardens.

The small South American deer known as "Brockets" will furnish some useful data to those who are interested in the study of incipient and variable characters, and the bearing which these have on the evolution of species. This much will be apparent to all who read Mr. J. A. Allen's valuable "Notes on American Deer of the Genus Mazama," in the Bulletin of the American Museum of Natural History, vol. xxxiv. Broadly separable, on the basis of coloration, into two groups, in the matter of their antlers, which are but simple spikes, no diagnostic characters can be found. These weapons indeed are very variable, even in adults of the same species, and should perhaps be regarded as disintegrating structures, since in both groups they display a marked tendency to malformation. In regard to cranial characters, it is evident that, as the author points out, the relative size and form of the nasals, the size and contour of the antorbital vacuity, the junction or otherwise of the premaxillaries and nasals, and the depth of the lachrymal pit are extremely untrustworthy as diagnostic characters, although they often enter into the diagnoses of species and subspecies.

Some valuable notes on the fauna and flora of the Vedda country and on the Vedda people, by Mr. F. Lewis, appear in *Spolia Zeylandica* (vol. x., part 37). The area surveyed includes part of the eastern and part of the Uva provinces, and is inhabited to-day by people of mixed origin, mainly Sinhalese and Tamils. Pure Veddas are practically extinct. The survivors of this primitive race exhibit a great reluctance to speak in the Vedda language in the presence of Europeans; nor are they more communicative in regard to the manners and customs of their race. Nevertheless, Mr. Lewis contrived to gain some valuable information when at Selavai, in the Panapa Pattu. From one old man he learned that the Veddas, in the days of their prosperity, were divided into a number of small clans, each of which occupied and hunted over a specific area of country, and had no connection with the others, who lived in separate communities. The women were kept in a state of rigid subjection, married as children, became mothers at fourteen, and passed the prime of life at thirty. These people had no domesticated animals save the dog, and their only weapons were the bow and arrow, the spear, and a small axe or hatchet. At one time, it appears, they were harassed by a pigmy people, the Nittawo, who lived in the country known as Lenama, which extended from Bagura, in the east, to the confines of the Kataragama hills on the west. These diminutive people lived in small troops, and inhabited caves, hollow trees, and the crevices of precipices. In stature they are said scarcely to have exceeded 3 ft. Through fear, or jealousy, they are said to have been exterminated about three or four generations ago by the Veddas themselves.

In the *Annot. Zoolog. Japan*, ix., part 1 (Tokio, 1915), Waro Nakahara describes the Japanese lace-wing flies of the subfamily Hemerobiinæ. Of the twenty-two species enumerated, three only are inhabitants also of Europe, and of these, two—*Hemerobius humuli* and *Micromus angulatus*—are also North American.

Abnormalities in the venous system of the frog are more or less familiar to teachers in zoological laboratories. W. E. Collinge gives (*Journ. Anat. and Physiol.*, l., pp. 37–42) some results from the dissection of five hundred specimens, of which twenty-two were in some respect abnormal. Of especial interest are the persistence of the caudal vein, of the right posterior cardinal sinus, and of the anterior abdominal vein's connection with the precavals on one side or both; also the continuity of a renal portal vein with the post-caval.

Prof. Nansen describes the details of construction of two closing tow-nets in *Publications de Circonstance,* No. 67, issued by the International Council for the Study of the Sea. The first net is the well-known form devised by Prof. Nansen for vertical hauls, which had not previously been described in detail. The second net is a modification of the first, adapted for horizontal towing. A current meter fitted in the mouth of the net is stated to make it possible to measure the volume of water which actually passes through the net.

The twenty-first volume of the *Rapports et Procès-verbaux des Réunions* of the International Council for the Study of the Sea, recently issued at Copenhagen, contains the administrative reports for the years 1913 and 1914, and its chief interest perhaps lies in the fact that it records the attempt which is being made to keep this international organisation in existence during the period of the European war. The report states that as regards participation for the year 1914–15, all countries except Germany have paid contributions, that for Russia, however, being an overdue contribution for the preceding year. In a letter of January 29, 1915, to the Danish Foreign Office, the German Government has explained its attitude in the following terms:—"Germany will during the war abstain from further co-operation in the work of the international investigations, because the carrying out of an essential part of the problems has been suspended by the present state of matters. Consequently the German delegates will not take part in the voting and resolutions of the organisation as long as war continues. The Imperial Government, however, hope to be able to resume participation when a more quiet time has ensued." As regards the scientific reports contained in the volume, those of importance deal with the investigations on herring fisheries.

Mr. L. Lancelot Burlingame has published a series of memoirs on *Araucaria brasiliensis* and on the origin and relationships of the Araucarians in the *Botanical Gazette*, vol. lvii., No. 6, vol. lix., No. 1, and vol. lx., Nos. 1 and 2 (1914–15). His researches embrace a careful study of the ovulate cone and female gametophyte, fertilisation, the development of the embryo and the seed, illustrated by a series of plates of microphotographs. In the two latter papers the various views of Araucarian affinities are reviewed, and the conclusion is arrived at that the Cordaitales are the nearest allies of the Araucarias, since they resemble them more nearly than any other conifers. The transitional conifers of the Mesozic are either Araucarians or Cordaitians, and it is suggested that some are ancestors of Sequoia and Cryptomeria. It is also suggested that the Abietineæ are derived directly from the Cordaitales or from very ancient members of the Araucarineæ.

In the cutivation of varieties of wheat, mixtures of types sometimes occur on the pure-culture plots, which are often very difficult to explain. In vol. x., part iv., of the Agricultural Journal of India, Mr. D. Milne shows that whole wheat grains fed to the bullocks working in the wheat fields in the growing season can pass through the animals, germinate, and thus account for some of these contaminations of the pure cultures. Six bullocks were fed on a special diet of whole wheat grains previously soaked for one hour in cold water. A mixture of green oat plants and wheat chaff was also given as fodder during the experiment. All the wheat grains voided by the animals were carefully collected, and at once placed on a bed of sterilised sand for germination tests. A considerable number of wheat grains capable of producing strong plants were taken from the dung of every bullock within 13½ hours from the start of the experiment. On the third day the number of grains passed by one bullock in 24 hours rose to more than 9000. After seven days the diet of whole wheat grains was replaced by whole gram grains, yet for two days after this change large numbers of wheat grains capable of germination continued to pass through the animals. As much as 20·5 per cent. of the grains fed to a single bullock were recovered, germinated, and produced strong healthy plants; the lowest figure from a single bullock was 9·6 per cent. The gram grains fed during the last four days of the experiment also passed through in quantity, apparently undigested, but practically none of these gram grains germinated. The author thinks that the amount of obviously undigested material which came through these bullocks was astonishing, but, in this country at any rate, farmers well know the superior digestibility of crushed or ground grain, so that the investigation suggested on this point would appear to be unnecessary.

FROM an American source (Bull. Seis. Soc. America, vol. v., 1915, pp. 155–9), we learn that several earthquakes were felt during last summer in countries now at war. On June 3 an earthquake occurred at Munich of sufficient violence to wreck some of the instruments in the observatory tower. On June 13 a severe earthquake disturbed the kingdom of Württemberg, being especially strong at Ebingen and Balingen. On August 11, at 10.14 a.m., a shock of unusual severity was felt at Laibach, the well-known seismic centre in the south of Austria. In the same journal, the occurrence is reported of several earthquakes at Avezzano on August 28, of a severe shock at Agualia (fifty-eight miles north-east of Rome) on September 23 at 7.15 p.m., felt also in Rome, and of a strong shock unaccompanied by damage, at Messina, on September 24.

Two articles by M. Louis Brunet, in the *Revue générale des Sciences* for November 30 and December 15, contain in about twenty pages a very complete and readable summary of the recent work which has been done on the constitution of Röntgen or X-rays, and their application to the determination of the arrangement of the atoms in crystalline bodies. The first article deals with the interference of rays reflected from the successive layers of atoms near the surface of a crystal, the forms of X-ray spectrometers, the characteristic X-ray spectra of the elements and the relations which have been found to exist between the wave-lengths of the principal lines of each element and the atomic numbers. According to Rutherford's theory of the atom, these represent the number of electrons in the nuclear charge of each atom. The second part deals more in detail with the passage of the X-rays through and their reflection from the surfaces of crystals. The principles of the method of analysis of the structure of a crystal as described by Bragg are given, and the application of them illustrated by zinc blend, diamond, calcite, certain nitrates and carbonates, and iron pyrites.

THE Comptroller-General of Patents informs us that the following notice as to renumbering specifications on publication will appear in the *Illustrated Official Journal* (*Patents*) of January 12:—In order to give the public the advantage of having abridgments of specifications up to date while retaining their numerical sequence, applications for patents made subsequent to 1915 will be given new numbers when their complete specifications are accepted or become open to public inspection before acceptance. The new numbers will start with No. 100,001 (without any indication of date), and will supersede the original application numbers in all proceedings after acceptance of the complete specifications. It is intended in future to issue abridgments of specifications in the journal a few weeks later than that in which their acceptance or publication is advertised, so that they will be available for search purposes soon after the printed copies of the specifications are on sale; but, until the system is fully in force, they will only be issued when there are sufficient to make up a full sheet of sixteen pages.

THE list of members just issued by the Liverpool Section of the Society of Chemical Industry calls for comment as a most praiseworthy beginning for the preparation of what amounts to a local "Who's Who" of chemists. Such a list will form a most useful asset in any attempt to organise the chemical profession to play a greater part in the affairs of the State. The Liverpool Section includes all members of the society residing or working in Lancashire, Cheshire, and North Wales, who are nearer of access to Liverpool than to Manchester—in all 283, a number which suggests that many chemists in the district have failed to become members of the society. The list is printed in four columns, and indicates for each individual the address, occupation, and name of the firm. A pleasing feature is the evidence afforded of the number of chemists employed by some of the leading manufacturers in the district.

STEADY progress has been made with the building of the new Southwark Bridge, although the war has hindered the delivery of materials. The work of constructing one of the river piers is described in *Engineering* for December 31. There are four of these piers, the new bridge being of five spans, instead of three, in order to coincide with the bridges to the east and west. The piers are all to be carried upon caissons founded in the London clay at a depth of 50 ft. below the Trinity high-water level. Two of the four caissons required for the river piers are 120 ft. long by 30 ft. wide, and the other two are 100 ft. 3 in. by 29 ft., the weight of each of the larger caissons being 200 tons; these are the longest caissons constructed in this country. At the present time two of the caissons have been lowered to the bed of the river, and a third is erected and riveted complete upon its staging. In lowering the caisson, excavation within the working-chamber proceeded until a point was approached about 5 ft. from foundation level; at this point the clay at each end of the chamber was not removed, but allowed to come in contact with the descending roof of the chamber for a length of about 12 ft. from each end. The weight of the caisson, together with the concrete and masonry, approximated to 5000 tons, but there was full control of the movements, and the downward travel was stopped easily at the given level.

The *Athenaeum* will in future continue its issue only as a monthly, and not weekly as heretofore. The new number will be published on January 15, at the price of a shilling.

The Cambridge University Press announces the forthcoming publication of vol. ii. of Dr. W. Ridgeway's "The Early Age of Greece," and a new edition of vol. i. of the work. The following "Cambridge Tracts in Mathematics and Mathematical Physics" are in preparation:—"The Definite Integral, its Meaning and Fundamental Properties," by Dr. E. W. Hobson; "An Introduction to the Theory of Attractions," by Dr. T. J. I'A. Bromwich; "Pascal's Hexagon," by H. W. Richmond; "Lemniscate Functions," by Dr. G. B. Mathews; "Chapters on Algebraical Geometry," by Prof. H. F. Baker; and "The Integrals of Algebraic Functions," by Prof. H. F. Baker.

OUR ASTRONOMICAL COLUMN.

Comet 1915*e* (Taylor).—Several communications to the Paris Academy of Sciences (*Comptes rendus*, December 20) concern Taylor's comet. At the Lyons Observatory M. J. Guillaume obtained a brief observation of the comet on December 6. A feeble nucleus was seen surrounded by a nebulosity about 1′ in diameter. Its magnitude was 9·5 and the colour was bluish. Positions were measured on December 11 and 13, the comet fading to 10·5 mag. M. Paul Brück has calculated the following orbit from observations made at Algiers (December 6), Lyons (December 11), and by himself at Besançon on December 14:—

Perihelion passage, 1916, February 26·986.

$$\left.\begin{aligned}\omega &= 14^\circ\ 13'\ 46''\\ \Omega &= 107^\circ\ 16'\ 10''\\ i &= 22^\circ\ 44'\ 23''\end{aligned}\right\}1915{\cdot}0$$

$$\log q = 0{\cdot}22625$$

This parabolic orbit represents the middle place with an error of $-9''$ in longitude and $-32''$ in latitude, and a second calculation is to be made. With the first ephemeris sent out from Copenhagen Prof. E. Strömgren stated that the orbit was apparently periodic in short period. In Circular No. 497 (*Astronomische Nachrichten*) Prof. H. Kobold directs attention to the similarity between Messrs. Braae and Fischer-Petersen's second orbit (Nature, December 23, 1915) and Lamp's elements for Brorsen's comet $\omega = 14^\circ\ 55{\cdot}6'$, $\Omega = 101^\circ\ 27{\cdot}6'$, $i = 29^\circ\ 23{\cdot}8'$ (1890).

An observation made at the Hill Observatory on January 1 indicates an increasing lag between the comet's actual position and that calculated from the above orbit, then amounting to about 30′ of arc in both R.A. and declination. The comet, easily seen in a three-inch finder, had evidently increased in brightness by about 2½ magnitudes since December 16.

The Spectra of Wolf-Rayet Stars.—A most significant clue to the relationships of these extremely interesting stellar bodies was afforded by an extraordinary piece of spectroscopic research carried out at Mount Wilson upon the faint vestiges of several novæ. It was then practically established that in their latest phases these bodies assume the well-known Wolf-Rayet features. Hartmann's observations of Nova Persei were confirmed and generalised. The suggestion was made that the Wolf-Rayet stars were possibly remnants of novæ. Extremely important evidence bearing on this point has now been brought forward by Dr. Max Wolf (*Astronomische Nachrichten*, 4824). He finds that in the case of several of these stars the spectra are variable in the oscillatory mode hitherto regarded as peculiar to the later stages of novæ. The variations are described as alterations in the hydrogen bands, especially Hδ, whilst the absorption lines are said to appear at times sharp, at others masked and weakened. As Dr. Max Wolf refers to the limitations of his instrumental equipment, developments must be looked for elsewhere. A photometric study of the same stars would most obviously be of great value.

Photo-electric Photometry.—Messrs. P. Guthnick and R. Prager announce (*Astronomische Nachrichten*, 4823) that the conjectured variability of α Cygni has been confirmed by numerous photo-electric measures. Minima were found, 1914, September 28 ±10*d*, and 1915, July 5, ±10*d*, the interval being a multiple of the period. Amplitude 0·07 mag., probably in the mode of δ Cephei. Short period oscillations are indicated. The variability of α Lyræ and γ Lyræ has also been evidenced. The light changes in both cases are described as very rapid and strictly periodic for the latter. α Lyræ, however, would seem to vary in a novel manner, with an average amplitude of 0·04 mag., γ Lyræ 0·03 mag.

Some Possibly Connected Solar and Planetary Phenomena.—An attempt has lately been made by Herr T. Köhl to trace a connection between some planetary phenomena and solar activity (*Astronomische Nachrichten*, 4821). Thus he finds that Jupiter's northern cloud belts appear to be especially weak at times of spot maxima, and become broader and more conspicuous during minima. The recorded appearances of the secondary light on the dark side of Venus are too scanty for comparison, but the later observations suggest coincidence in time with auroral displays on earth.

Determination of Radial Velocities by Objective Prisms.—Nearly two years ago M. Hamy suggested an ingenious method of adapting the prismatic camera to line of sight work (Nature, vol. xcii., p. 616, January 29, 1914). Whilst the determination of radial velocities of the fainter stars is actually largely in way of being realised by increased telescopic power and suitable spectrograph design rather than by the employment of novel methods of attack, M. Hamy has not been deterred from investigating further the theory of his method. He now states (*Comptes rendus*, No. 22, 1915) that the use of a train of prisms would only necessitate a modification of the reduction formulæ, and then develops the requisite changes for the case of an instrument mounting two prisms.

Radial Velocity of R Coronæ Borealis.—Dr. H. Ludendorff, in a note in the *Astronomische Nachrichten* (No. 4823), publishes the results of some spectroscopic observations of R Coronæ. Six spectrograms were secured during June, 1913, and June, 1915, whilst the variable was at normal brightness, as was the case during earlier observations in 1902–1906. The spectrum resembles that of α Persei, and no signs of alteration could be detected. The mean radial velocity for the six plates is +24·8 km. (range=5 km.). The earlier measures gave +24·7 (range=6·4). The small range, under the conditions, leaves undecided the question of variability.